UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
RESEARCH TRIANGLE PARK, NC 27711

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OFFICE OF
AIR QUALITY PLANNING
AND STANDARDS

MEMORANDUM

SUBJECT: Calculation of Prevention of Significant Deterioration (PSD) Increment Consumption and Expansion, Paired in Space and Time

FROM: Warren D. Peters, Clearinghouse Coordinator
Air Quality Modeling Group, EMAD (D243-01)

TO: Kevin Golden, Regional Meteorologist
Programs, Air, and Radiation, Regional Office VIII

The Clearinghouse has received and has reviewed your two concerns in reference to the calculation of PSD increment consumption-paired in space and time. Specifically, your first concern was based on a comment that was received:

> "EPA's procedure for calculating increment in the current project has this problem. Because EPA determines increment by subtracting the baseline concentrations from current concentrations on an hour-by-hour basis, they virtually guarantee that North Dakota will fail the increment test. There will inevitably be hours when the plumes from the baseline sources impact different receptors than the current sources. So even if the overall air quality in the Class 1 area stays the same or even improves, EPA's method will lead to a conclusion that increment is exceeded, because changes at a particular receptor for a particular 3-hour or 24-hour period will exceed the criteria. This technique and conclusion are only valid if the model has demonstrated skill at predicting concentrations at a particular time and location, but it has not."

The issue is whether the CALPUFF has been correctly applied to determine PSD increment concentrations in the North Dakota and Montana Class 1 areas. EPA's Guideline on Air Quality Models requires that for PSD modeling, "sequential modeling must demonstrate that allowable increments are not exceeded *temporally* and spatially, i.e., for all receptors *for each time period* throughout the year(s)."[1] This means that to determine compliance with the PSD increment, one should determine whether the net change in increment consuming emissions since

[1] 40 C.F.R. Part 51, Appendix W, § 11.2.3.3(b) (emphasis added).

the baseline date has resulted in pollutant concentrations exceeding the PSD increment at any specific time (temporal) and location (spatial) in the current year. The amount of PSD increment that has been consumed in a PSD area is determined from the emissions increases and decreases which have occurred from sources since the applicable baseline date. Increment consumption calculations must reflect only the ambient pollutant concentration change attributable to increment-affecting emissions.[2] Specific times are used to ensure temporal representativeness which is primarily a function of the day-to-day variations in weather conditions. In determining whether the 24-hour SO_2 increment has been exceeded, one should compare the modeled concentrations resulting from the net change in increment consuming emissions to the level of the PSD 24-hour average SO_2 increment on every day in the meteorological record that is modeled. The dispersion model (in this case CALPUFF) calculates daily concentrations at each Class I receptor over the minimum five year period. The model then processes the data to determine the high second-high 24-hour average concentration at each receptor for each year of data. This value is then compared to the relevant increment.

The issue, determining maximum changes in air quality impacts on both a spatially and temporally consistent basis, has been raised in the past. EPA's response to these questions has always been that the maximum amount of PSD increment consumed must be determined by modeling pollutant concentrations sequentially for each time period.[3]

In regard to your second concern (which is a related to increment consumption), the commenter goes on to claim that the Agency is underestimating the PSD increment expansion credit for sources that existed in 1977 but have since shut down. The only practical way one can account for these increment expansion "credits" in CALPUFF is to use CALSUM to subtract out these credits from the increment consumption values determined in a previous CALPUFF run. The traditional approach of simply modeling the delta in emissions between baseline and current year emissions cannot be used because these sources no longer exist, and negative emissions will not work in CALPUFF. While CALPUFF requires a more complicated process to credit increment expansion sources, it calculates increment in the same manner as ISCST, that is paired in space and time. This is exactly the same method that would be used by either CALPUFF or ISC in determining whether a proposed new source is contributing to existing PSD increment concentrations.

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[2] *See also*, Workshop Manual, *supra* note 45, at C.10, C.62 - C.63.

[3] See, e.g., Memorandum from John R. O'Connor, Acting Director, EPA Office of Air Quality Planning and Standards, to Thomas W. Devine, Director Air and Waste Management Division, EPA Region IV, PSD Increment Consumption Calculations (January 20, 1984) (*available at http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/clculatn.pdf)* ; Memorandum from Sheldon Meyers, Director, Office of Air Quality Planning and Standards, to the Air Directors in the EPA Regional Offices, Emissions Trading Policy - Technical Clarifications (February 17, 1983). Available at: *http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/emtradp.pdf)*. Memorandum from Alexandra B. Smith, Director, Air and Waste Management Division, EPA Region X, to Sheldon Meyers, Director, Office of Air Quality Planning and Standards, Determination of Air Quality Degradation (May 3, 1983). Available at: *http://www.epa.gov/rgytgrnj/programs/artd/air/nsr/nsrmemos/cnsumptn.pdf*, United States Environmental Protection Agency SO_2 Guideline Document - Appendices, Office of Air Quality Planning and Standards, EPA-452/R-94-008, at 6-14 (February 1994) Available at: http://www.epa.gov/ncepihom/Catalog/EPA-452/R-94-008.html).

In conclusion, we believe that the above approach which the Agency uses to determine increment consumption and credit for increment expansion is appropriate and is consistent with precedence and regulation.

cc: Dan DeRoeck, IIG (C339-03)